ELECTRONICS

8156

COMPACTRON BEAM PENTODE

FOR RADIO-FREQUENCY POWER AMPLIFIER APPLICATIONS

DESCRIPTION AND RATING

The 8156 is a compactron beam pentode designed for use as a radio-frequency power amplifier in mobile equipment.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC*	13.5±1.5	Volts
Heater Current‡	0.3	Amperes
Direct Interelectrode Capacitances§		
Grid-Number 1 to Plate: (g1 to p)	0.07	pf
Input: g1 to (h + k + g2 + b.p.)	11	pf
Output: p to (h + k + g2 + b.p.)	5.0	pf

MECHANICAL

Operating Position - Any
Envelope - T-9, Glass
Base - E12-70, Button 12-Pin
Outline Drawing

Maximum Diameter	1.188	Inches
Maximum Over-all Length	2.313	Inches
Maximum Seated Height	1.938	Inches

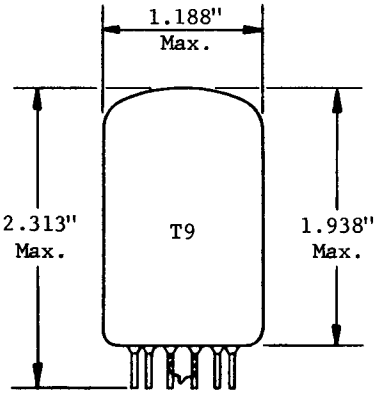
MAXIMUM RATINGS

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

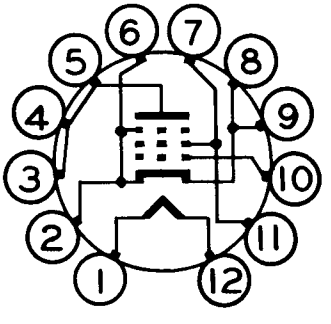
PHYSICAL DIMENSIONS



TERMINAL CONNECTIONS

Pin 1 - Heater
Pin 2 - Cathode and Beam Plates
**Pin 3 - Plate
**Pin 4 - Plate
**Pin 5 - Plate
Pin 6 - Cathode and Beam Plates
Pin 7 - Grid Number 2 (Screen)
Pin 8 - Cathode and Beam Plates
Pin 9 - Cathode and Beam Plates
Pin 10 - Grid Number 1
Pin 11 - Grid Number 2 (Screen)
Pin 12 - Heater

BASING DIAGRAM



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MAXIMUM RATINGS (Cont'd)

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY AND RADIO-FREQUENCY POWER AMPLIFIER—CLASS C FM TELEPHONY

ABSOLUTE-MAXIMUM VALUES	CCS¶	ICAS#	IMS△	
DC Plate Voltage	500	600	600	Volts
DC Screen Voltage	250	250	250	Volts
DC Grid-Number 1 Voltage	-100	-100	-150	Volts
DC Grid-Number 1 Current	5.0	5.0	5.0	Milliamperes
DC Plate Current	100	100	100	Milliamperes
Plate Dissipation	11	13	15	Watts
Screen Dissipation	2.5	2.5	2.5	Watts
Peak Heater-Cathode Voltage				
Heater Positive with Respect to Cathode	100	100	100	Volts
Heater Negative with Respect to Cathode	100	100	100	Volts
Bulb Temperature at Hottest Point	220	220	220	C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Plate Voltage	200	Volts
Screen Voltage	125	Volts
Grid-Number 1 Voltage	-9.0	Volts
Plate Current	75	Milliamperes
Screen Current	3.5	Milliamperes
Transconductance	7600	Micromhos
Grid-Number 1 Voltage, approximate		
Ib = 100 Microamperes	-45	Volts

TYPICAL OPERATION AS CLASS C AMPLIFIER	CCS¶	ICAS#	IMS△	
Frequency	175	175	175	Megacycles
DC Plate Voltage	250	300	400	Volts
DC Screen Voltage	185	180	170	Volts
DC Grid-Number 1 Voltage, approximate	-70	-80	-60	Volts
Grid-Number 1 Resistor	20000	20000	20000	Ohms
DC Plate Current	100	95	90	Milliamperes
DC Screen Current	11	10	10	Milliamperes
DC Grid-Number 1 Current, approximate	3.5	4	3	Milliamperes
Driving Power, approximate	1	1	1	Watts
Useful Power Output, approximate	14	15.5	21	Watts

NOTES

* The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.

‡ Heater current of a bogey tube at Ef = 13.5 volts.

§ Without external shield

¶ Continuous Commercial Service (CCS) is defined as that type of service in which normal tube life and reliability of performance under continuous operating conditions are the prime consideration.

\# Intermittent Commercial and Amateur Service (ICAS) is defined to include the many applications where the transmitter design factors of minimum size, light weight, and considerably increased power output are more important than long tube life. In this service, life expectancy may be one-half that obtained in Continuous Commercial Service.

Under the ICAS classification are such applications as the use of tubes in amateur transmitters, and the use of tubes in equipment where transmissions are of an intermittent nature. The term "intermittent" is used to identify operation conditions in all applications other than amateur in which no operating or "on" period exceeds 5 minutes and every "on" period is followed by an "off" or standby period of at least the same or greater duration.

NOTES (Cont'd)

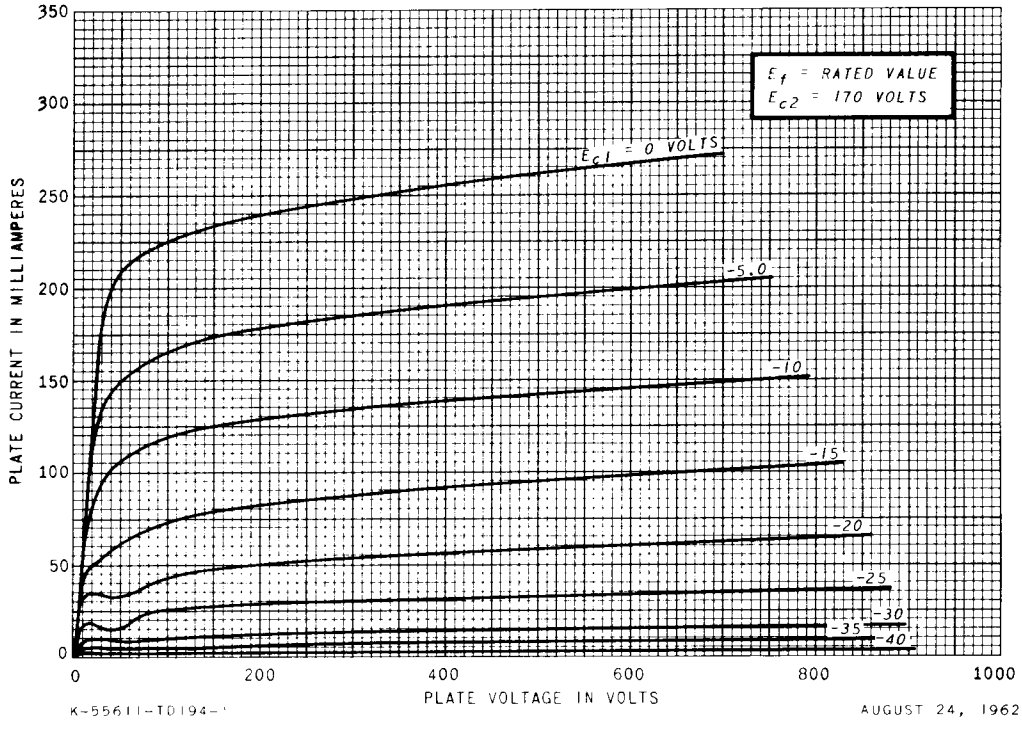
Δ Intermittent Mobile Service (IMS) is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements even though the average life expectancy of tubes used in such transmitters is reduced. Tube ratings for IMS service are established on the basis that the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of 5 minutes followed by "off" periods of at least 5 minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

Although the use of tubes under IMS ratings involve great reduction in tube life, such use can be justified as economical practice in applications where high power is intermittently desired from small tubes.

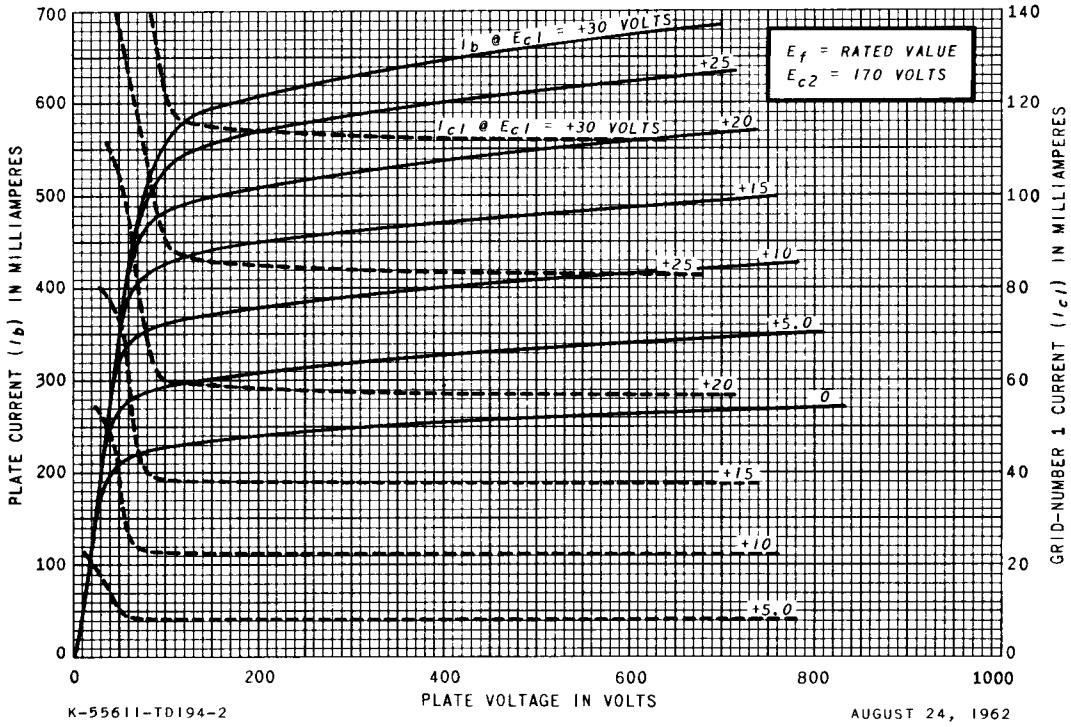
** Socket contacts for these three pins should be connected together.

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or elements. In the absence of an express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.

AVERAGE PLATE CHARACTERISTICS



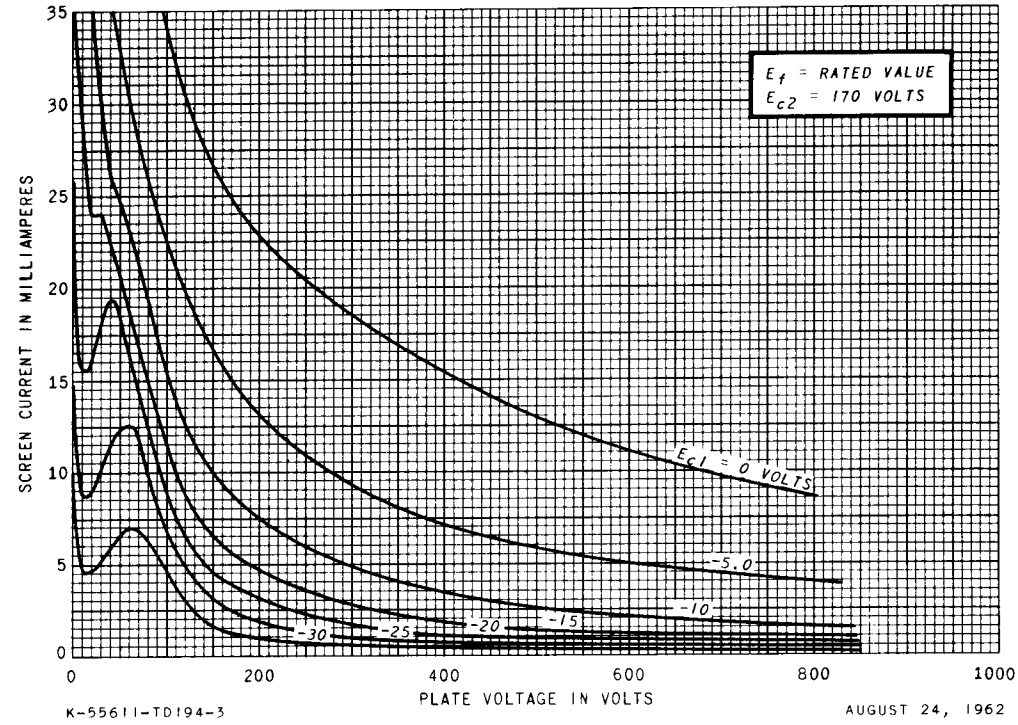
AVERAGE PLATE CHARACTERISTICS



K-55611-TD194-2

AUGUST 24, 1962

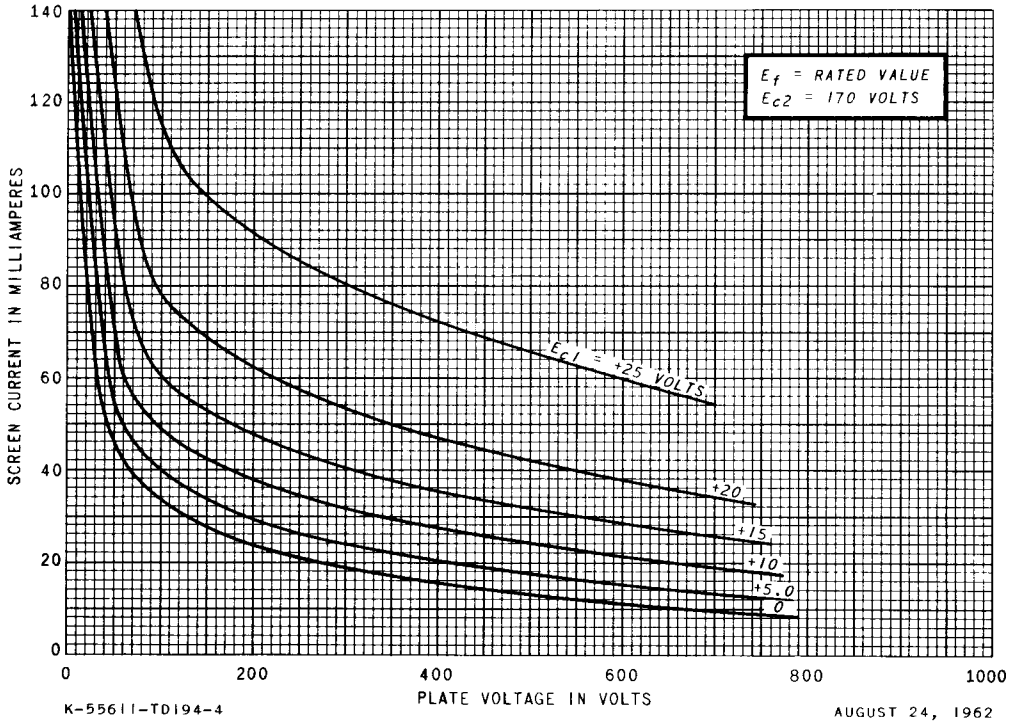
AVERAGE CHARACTERISTICS



K-55611-TD194-3

AUGUST 24, 1962

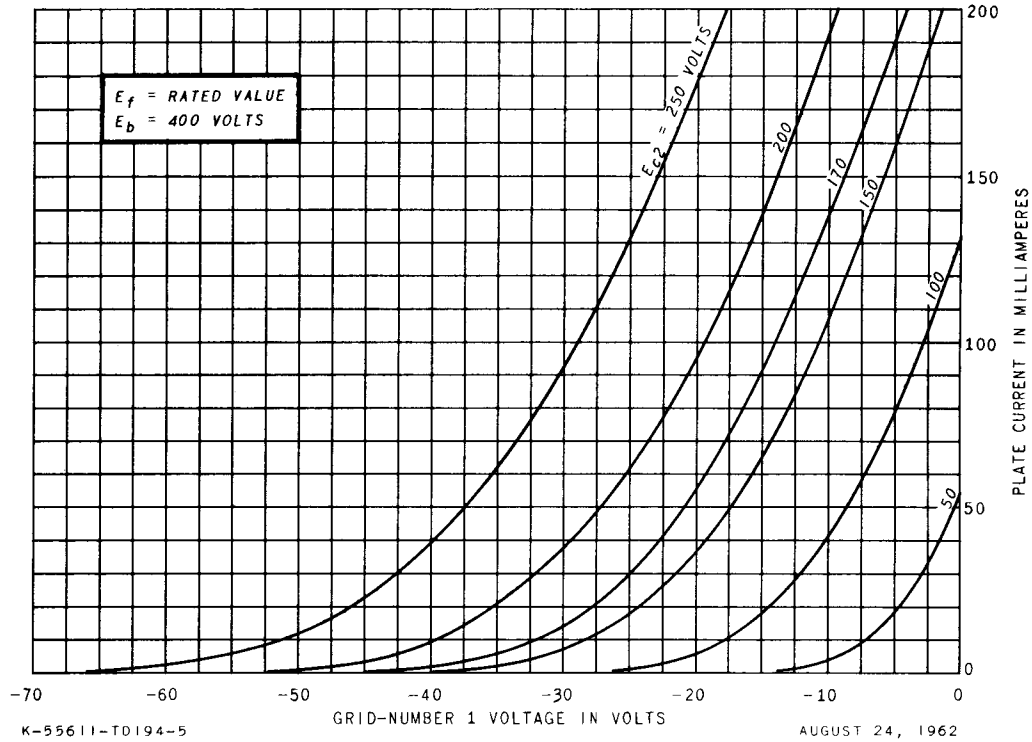
AVERAGE CHARACTERISTICS



K-55611-TD194-4

AUGUST 24, 1962

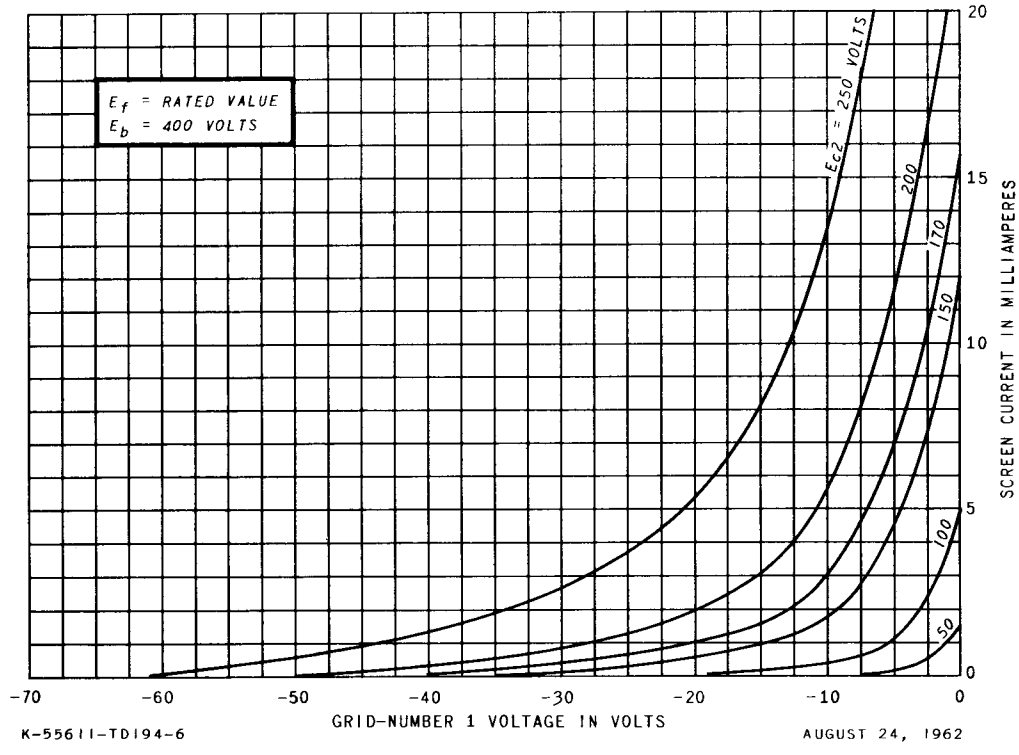
AVERAGE TRANSFER CHARACTERISTICS

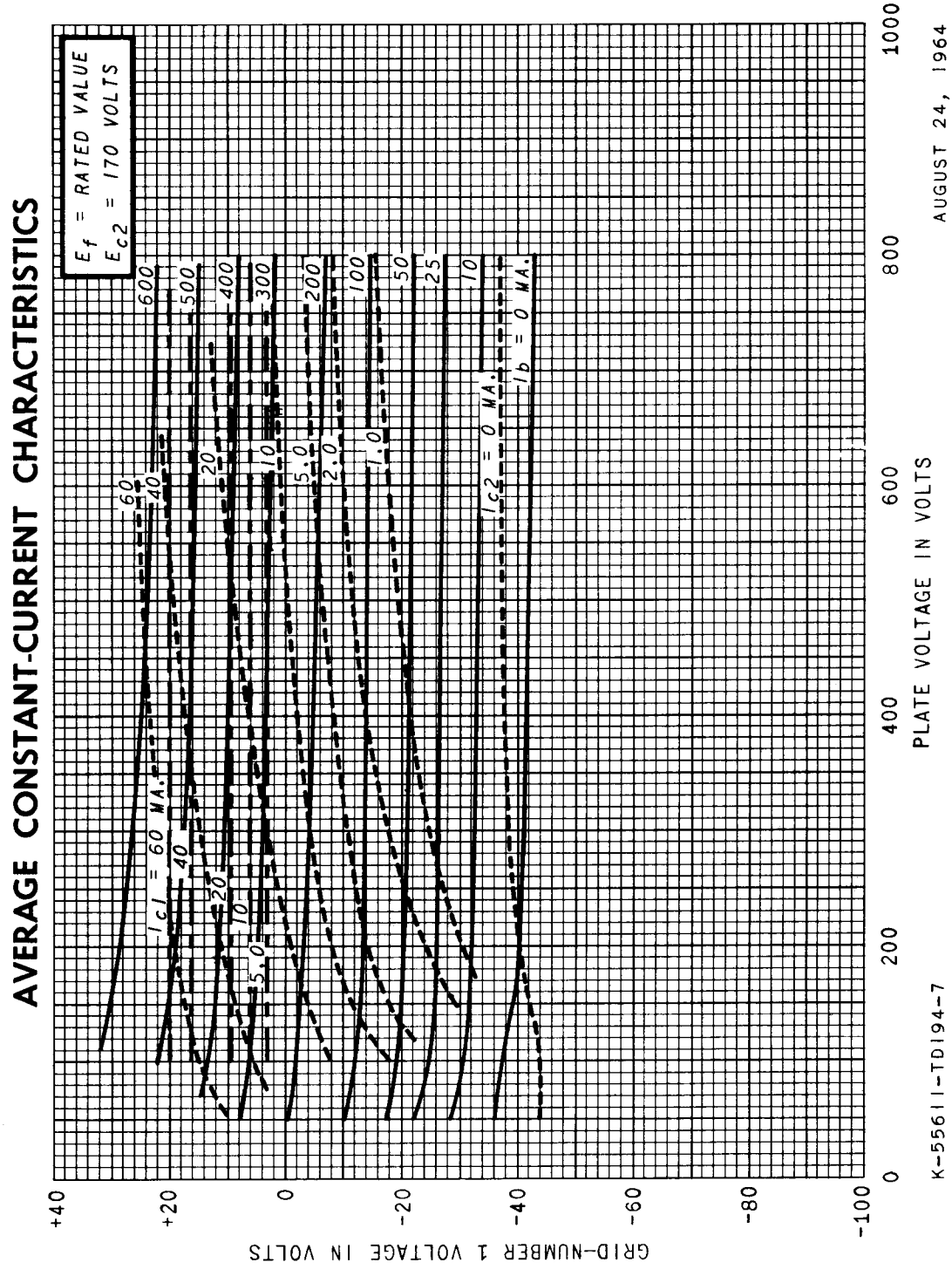


K-55611-TD194-5

AUGUST 24, 1962

AVERAGE TRANSFER CHARACTERISTICS




AVERAGE CONSTANT-CURRENT CHARACTERISTICS
E_f = RATED VALUE
E_{c2} = 170 VOLTS
I_{c1} = 60 MA.
40
20
10
5.0
600
500
400
300
200
100
50
25
10
5.0
2.0
1.0
I_{c2} = 0 MA.
I_b = 0 MA.
+40
+20
0
-20
-40
-60
-80
-100
GRID-NUMBER 1 VOLTAGE IN VOLTS
0
200
400
600
800
1000
PLATE VOLTAGE IN VOLTS
K-5561I-TD194-7
AUGUST 24, 1964

TUBE DEPARTMENT

GENERAL ELECTRIC

Owensboro, Kentucky